

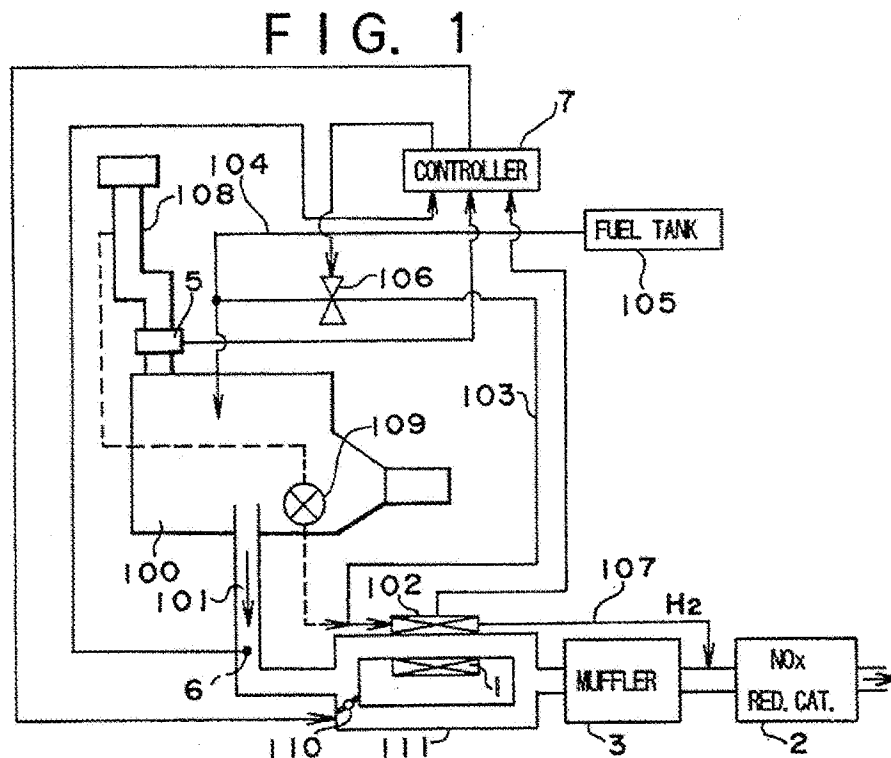
REMARKS

Claims 1-6, 9-11, and 13-34 are pending. Claims 7, 8, and 12 were previously cancelled without prejudice. No amendments are made herein. All arguments set forth herein are made without prejudice.

Claims 1-3, 5-6, 13, 14, 16-18, 25, and 27-34 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,193,340 ("Kamihara") in view of U.S. Patent 5,412,946 ("Oshima") and U.S. Patent 7,000,384 ("Kagenishi"). Applicants respectfully traverse this rejection.

Claim 1 defines a method of controlling an exhaust filter regeneration regime and recites "injecting fuel into an exhaust stream and thereby increasing an exhaust stream temperature, said increasing exhaust stream temperature being in conjunction with a catalytic treatment element; metering fuel injection dependent upon the exhaust stream temperature; pre-heating fuel to be injected with vehicle waste heat; and recording a regeneration regime history and modifying the regeneration regime based on the recorded history." This method is patentable over the Kamihara-Oshima-Kagenishi combination.

The primary reference, Kamihara, is acknowledged by the office action (at 2) as failing to teach or suggest preheating fuel to be injected into an exhaust stream with vehicle waste heat, which is a feature of the method of claim 1. The office action cites (at 2-3) Oshima as disclosing the preheating fuel with waste heat feature of the claim, specifically identifying Fig. 1 (reproduced below) of the reference for this disclosure.



However, Oshima does not teach or suggest “pre-heating fuel to be injected [into an exhaust stream] with vehicle waste heat,” as recited by claim 1. Instead, Oshima instructs that fuel from a main tank (105) is diverted from a conduit (104) that supplies the engine (100) to the vehicle catalytic converter / hydrogen generator (102) by an auxiliary conduit (103), which puts the fuel *directly* into the vehicle exhaust conduit (101) without any pre-heating of that fuel. There is no device or system proposed by Oshima to heat the fuel *before* (i.e., preheat) it is injected into the exhaust conduit (101) where the office action argues it would ostensibly be heated by vehicle waste heat, much less one that actually utilizes waste heat from the engine to heat fuel at all. Thus, this reference fails to teach or suggest that for which it is cited in the office action, causing the entirety of the rejection to likewise fail.

Furthermore, the Oshima reforming catalytic converter / hydrogen generator (102) converts supplied fuel into H₂ - reduction agent - for use with a NO_x reduction catalyst (2) further

downstream along the exhaust (101). Thus, at best, in Oshima it is H₂ that is injected into the exhaust conduit (101), not fuel and not preheated fuel, per the claims. Oshima does not disclose pre-heating fuel to be injected (as fuel), but instead is directed to fundamentally changing the chemical composition of fuel so that H₂ is generated and is then eventually injected into the exhaust conduit upstream of a NO_x reduction catalyst. Oshima discloses at column 4, a number of chemical reactions that take place within the reduction catalyst, depending on the fuel type used. All of these reactions result in the fuel being reformed into H₂ and other compounds, thus, in addition to not being pre-heated and not being pre-heated with waste heat, fuel is not even injected into the exhaust conduit in Oshima.

Additionally, there is no suggestion in Oshima to partially heat the fuel such that H₂ generation within the reforming catalytic converter (102) does not occur. Confirming this, Oshima at column 7, lines 1-14 discloses another embodiment of an H₂ generator (11) wherein methanol is injected into a coiled tube that is positioned within an exhaust conduit (113). Like the reforming catalytic converter / hydrogen generator (102) discussed above, this H₂ generator does not pre-heat fuel to be subsequently injected into the exhaust stream, but it again fundamentally alters the chemical composition of the fuel such that it is turned into H₂ (it is no longer fuel, as with the other embodiment discussed above) and other compounds with the sole aim of reacting with and decreasing the amount of NO_x in the exhaust gas.

Nowhere in Oshima is it disclosed that waste heat from the engine is used to pre-heat fuel before the fuel is injected into the exhaust stream. Moreover, Oshima is not interested in injecting fuel into the exhaust stream at all. Oshima's sole aim is to convert fuel into H₂ for subsequent injecting into the exhaust conduit. Therefore, contrary to the office action arguments, Oshima does not teach any form of fuel injection.

Even if Oshima did teach injecting fuel into an exhaust stream, or preheating fuel for such a purpose, or using waste engine heat to do this preheating, none of which it does, there would have been no motivation to have combined Oshima with Kamihara and Kagenishi for such

purposes. The rationale for such combination argued in the office action that “use of the waste heat of the exhaust gas to heat fuel before injecting into the exhaust gas [would improve] the efficiency of the filter regeneration,” however, is incorrect. The idea that fuel must or should be heated before injection into an exhaust system for enhanced exhaust filtration is not suggested anywhere in the reference, nor is this indicated in the office action to be a well known feature or desire in the art. As discussed above, Oshima fails to suggest anywhere that fuel should be heated before entering the exhaust conduit and the office action provides no possible source, other than the present application, for such a concept.

Even if Oshima, another cited reference, or some other source did suggest that heating fuel would be advantageous to filtering exhaust gas, nowhere does Oshima or any other source identified by the office action (or not) indicate that such heating could advantageously be achieved using *engine* heat applied *before* the fuel is added to the exhaust system. There is simply no motivation to combine the references in the way suggested in the office action.

Oshima is not concerned with regenerating an exhaust filter, but rather with reducing NO_x in the exhaust gas. Even if this document were considered by one having ordinary skill in the art for combining with Kamihara and/or Kagenishi, the resulting juxtaposition of features resulting from such a combination would not provide anything approaching a technically sound system. The skilled person would, therefore, quickly dismiss such a combination for several reasons, as follows.

Oshima does not provide the “pre-heating of the fuel to be injected” feature recited by claim 1 (and other claims also), and therefore, Oshima would not bring any useful features to Kamihara. Further, Kamihara’s objective is to regenerate a filter, but there is nothing in Oshima to suggest that any filter would be regenerated. The only mention of a filter in Oshima is a very brief comment at column 6, lines 42-44 stating, “a soot trapper...may be provided upstream of the NO_x reduction catalyst.” This does not amount to a suggestion for combination. Generally, Oshima is directed towards a system that aims to reduce the amount of NO_x in engine exhaust gas by injecting newly generated H₂ into the exhaust (see abstract) – this is a different aim than that of Kamihara,

which is to regenerate an exhaust filter by promoting an exothermic reaction in the filter (see abstract of Kamihara).

If anything, the references actually teach away from their combination as their purposes are too divergent. In column 10, lines 60-65, Oshima discloses that NO_x conversion is improved if no soot is formed on the NO_x reduction catalyst. This is in direct conflict with the system of Kamihara, which is designed to deal with and rectify particulate build-up (e.g., soot and the like) on a trap filter. The system of Oshima is therefore wholly unsuitable for combination with Kamihara. Furthermore, even if, in a bid to avoid soot build-up, it were considered to add the NO_x reducing filter of Oshima downstream of the trap filter of Kamihara, the H₂ that would be injected upstream from the trap filter (this is where Kamihara positions its injection valve 5) would be oxidized when passing through the oxidation catalyst of the trap filter of Kamihara (see column 3, lines 23-29 of Kamihara). Consequently, the aim of Oshima, which is to reduce NO_x in the exhaust gas would be destroyed as there would be no H₂ to promote the desired reaction.

If the skilled person was motivated to simply bolt on the Oshima system downstream from the trap filter of Kamihara (e.g., motivated to "try"), this would also not result in the claimed invention. The resulting system would comprise a trap filter with fuel injected upstream in order to promote combustion of particulates in the trap filter, followed by a NO_x reducing catalyst downstream of the trap filter that operates by way of injected H₂. At no point in such a system would fuel be pre-heated with vehicle waste heat, with that pre-heated fuel then being injected into the exhaust stream to increase the exhaust stream temperature.

Also, Oshima specifically discloses at column 5, lines 42-47 that the NO_x reduction catalyst should be disposed *away* from a high temperature position in order to prevent an undesired reaction of H₂ and O₂ rather than the desired H₂ and NO_x reaction. This explicitly discloses that Oshima does not aim to increase the exhaust gas temperature, which is in direct conflict with Kamihara. For this reason alone, Oshima would not be combined with Kamihara.

The two very different systems of Kamihara and Oshima require the measuring of different parameters and aim to provide different effects within an exhaust system. Accordingly, the two documents would not have been combined by one of ordinary skill in the art.

Turning to Kagenishi, this document discloses the desire to combust both O_2 and NO_2 with filter 18 (see for example column 6, lines 61-62) which would produce an exothermic reaction. Additionally, both O_2 and fuel is mixed with the exhaust gas (column 7, lines 45-63) to promote an exothermic reaction in the filter – this is further evidence of incompatibility (because of excess heat) with a system such as Oshima that is concerned with injecting H_2 to promote a NO_x reducing reaction as opposed to an undesired H_2 and O_2 reaction.

Oshima discloses at column 10, lines 24-28 that the NO_x reduction catalyst achieves peak performance at about 150-300 °C when NO_x reduction is effected by H_2 . However, Kagenishi discloses at column 7, lines 7-18 that continuous regeneration of the filter is only considered to occur at 300 °C or above. This is in direct conflict with the teaching of Oshima, and shows that the systems of these references are at least partially incompatible and is a further teaching away from combining Kagenishi, Oshima, and Kamihara. Additionally, neither Kamihara nor Kagenishi comprise, or disclose any desire to include a NO_x reducing catalyst. The addition of such a device, as is the focus of Oshima, would be cumbersome and needless and is yet further evidence of teaching away from combining Oshima with Kagenishi and/or Kamihara.

Since the Kamihara, Kagenishi, and Oshima reference would not reasonably be combined as they have been in rejecting independent claim 1 and, even if they would have been combined, the combination still would not have taught or suggested each feature of the claimed invention, independent claim 1 and each claim depending from claim 1 is patentable over the Kamihara-Kagenishi-Oshima combination. Applicants respectfully request that the rejection of claims 1-6, 9, and 10 be withdrawn and these claims allowed.

Claim 13 defines a method of triggering an exhaust filter regeneration regime and recites “monitoring filter pressure peak values; identifying when a filter load exceeds a predetermined

value from the monitored filter pressure peak values and triggering a regeneration regime; initiating fuel injection into an exhaust stream upon triggering the exhaust filter regeneration regime; pre-heating fuel to be injected with vehicle waste heat; and recording a regeneration regime history and modifying the regeneration regime based on the recorded history.” This method is not taught or suggested by the Kamihara-Kagenishi-Oshima combination.

As discussed above in relation to the patentability of independent claim 1, the Kamihara-Kagenishi-Oshima combination fails to teach or suggest “pre-heating fuel to be injected with vehicle waste heat,” as also recited by independent claim 13. For this reason, without more, this claim is patentable over the combination. Furthermore, as extensively discussed above, Oshima would not have been combined with the other references because there is, at best, no motivation to do so, and at worst, teaching away from doing so within the disclosures of the combined references themselves. For these reasons, Applicants respectfully request that the rejection of independent claim 13 be withdrawn and the claim allowed.

Claim 14 defines a method of triggering an exhaust filter regeneration regime in which fuel is injected into an exhaust stream to increase exhaust stream temperature in conjunction with a catalytic treatment element and recites “obtaining a value of catalytic treatment element temperature; triggering the regeneration regime when the obtained temperature exceeds a predetermined value; pre-heating fuel to be injected with vehicle waste heat; and recording a regeneration regime history and modifying the regeneration regime based on the recorded history.” This method is not taught or suggested by the Kamihara-Kagenishi-Oshima combination.

As discussed above in relation to the patentability of independent claim 1, the Kamihara-Kagenishi-Oshima combination fails to teach or suggest “pre-heating fuel to be injected with vehicle waste heat,” as also recited by independent claim 14. For this reason, without more, this claim and each claim depending therefrom (claim 15) is patentable over the combination. Furthermore, as discussed above, Oshima would not have been combined with the other references because there is no motivation to do so and the references teach away from their combination. For

these reasons, Applicants respectfully request that the rejection of independent claim 14 be withdrawn and the claim allowed.

Claim 16 defines a method of controlling an exhaust filter regeneration regime and recites “implementing an exhaust stream temperature control strategy; monitoring variation in exhaust stream temperature and at least one control parameter; obtaining a correlation between variation in exhaust stream temperature and the control parameter and adjusting the temperature control strategy based on the correlation obtained; pre-heating fuel to be injected into the exhaust stream with vehicle waste heat; and recording a regeneration regime history and modifying the regeneration regime based on the recorded history.” This method is not taught or suggested by the Kamihara-Kagenishi-Oshima combination.

As discussed above in relation to the patentability of independent claim 1, the Kamihara-Kagenishi-Oshima combination fails to teach or suggest “pre-heating fuel to be injected into the exhaust stream with vehicle waste heat,” as also recited by independent claim 16. For this reason, without more, this claim is patentable over the combination. Furthermore, as discussed above, Oshima would not have been combined with the other references because there is no motivation to do so and the references teach away from their combination. For these reasons, Applicants respectfully request that the rejection of independent claim 16 be withdrawn and the claim allowed.

Claim 17 defines an exhaust filter regeneration apparatus and recites “a fuel injector arranged to be mounted in an exhaust stream conduit; a controller for controlling the fuel injector, said fuel injector and said controller being configured to implement an exhaust filter regeneration regime comprising injecting fuel into an exhaust stream and thereby increasing an exhaust stream temperature, said increasing exhaust stream temperature being in conjunction with a catalytic treatment element; and a metering of fuel injection dependent upon the exhaust stream temperature; wherein the apparatus is further arranged to pre-heat fuel to be injected with vehicle waste heat, record a regeneration regime history, and modify the regeneration regime based on the recorded

history.” This apparatus is not taught or suggested by the Kamihara-Kagenishi-Oshima combination.

As discussed above in relation to the patentability of independent claim 1, the Kamihara-Kagenishi-Oshima combination fails to teach or suggest “the apparatus is further arranged to pre-heat fuel to be injected with vehicle waste heat,” as recited by independent claim 17. For this reason, without more, this claim is patentable over the combination. Furthermore, as discussed above, Oshima would not have been combined with the other references because there is no motivation to do so and the references teach away from their combination. For these reasons, Applicants respectfully request that the rejection of independent claim 17 be withdrawn and the claim allowed.

Claim 18 defines an exhaust filter regeneration apparatus and recites “an exhaust stream conduit and a fuel injector mounted therein and arranged to inject fuel in an exhaust stream direction and pre-heat fuel to be injected with vehicle waste heat; and wherein the apparatus is further arranged to record a regeneration regime history and modify the regeneration regime based on the recorded history.” This apparatus is not taught or suggested by the Kamihara-Kagenishi-Oshima combination.

As discussed above in relation to the patentability of independent claim 1, the Kamihara-Kagenishi-Oshima combination fails to teach or suggest “an exhaust stream conduit and a fuel injector mounted therein and arranged to inject fuel in an exhaust stream direction and pre-heat fuel to be injected with vehicle waste heat,” as also recited by independent claim 18. For this reason, without more, this claim and each claim depending therefrom (claims 19-22) is patentable over the combination. Furthermore, as discussed above, Oshima would not have been combined with the other references because there is no motivation to do so and the references teach away from their combination. For these reasons, Applicants respectfully request that the rejection of independent claim 18 be withdrawn and the claim allowed.

Claim 29 defines a computer readable medium storing a set of instructions to operate a computer arranged to implement an exhaust filter regeneration regime and recites “injecting fuel into an exhaust stream and thereby increasing an exhaust stream temperature, said increasing exhaust stream temperature being in conjunction with a catalytic treatment element; metering fuel injection dependent upon the exhaust stream temperature; pre-heating fuel to be injected with vehicle waste heat; and recording a regeneration regime history and modifying the regeneration regime based on the recorded history.” This device is not taught or suggested by the Kamihara-Kagenishi-Oshima combination.

As discussed above in relation to the patentability of independent claim 1, the Kamihara-Kagenishi-Oshima combination fails to teach or suggest “pre-heating fuel to be injected with vehicle waste heat,” as also recited by independent claim 29. For this reason, without more, this claim and each claim depending therefrom (claim 30) is patentable over the combination. Furthermore, as discussed above, Oshima would not have been combined with the other references because there is no motivation to do so and the references teach away from their combination. For these reasons, Applicants respectfully request that the rejection of independent claims 29 and 30 be withdrawn and the claims allowed.

Claim 31 defines an engine control unit configured to implement an exhaust filter regeneration regime and recites “injecting fuel into an exhaust stream and thereby increasing an exhaust stream temperature, said increasing exhaust stream temperature being in conjunction with a catalytic treatment element; metering fuel injection dependent upon the exhaust stream temperature; pre-heating fuel to be injected with vehicle waste heat; and recording a regeneration regime history and modifying the regeneration regime based on the recorded history.” This device is not taught or suggested by the Kamihara-Kagenishi-Oshima combination.

As discussed above in relation to the patentability of independent claim 1, the Kamihara-Kagenishi-Oshima combination fails to teach or suggest “pre-heating fuel to be injected with vehicle waste heat,” as recited by independent claim 31. For this reason, without more, this claim is

patentable over the combination. Furthermore, as discussed above, Oshima would not have been combined with the other references because there is no motivation to do so and the references teach away from their combination. For these reasons, Applicants respectfully request that the rejection of independent claim 31 be withdrawn and the claim allowed.

Claim 32 defines a computer readable medium storing a set of instructions to operate a computer arranged to implement an exhaust filter regeneration regime and recites “injecting fuel into an exhaust stream and thereby increasing an exhaust stream temperature, said increasing exhaust stream temperature being in conjunction with a catalytic treatment element; metering fuel injection dependent upon the exhaust stream temperature; pre-heating fuel to be injected with vehicle waste heat; and recording a regeneration regime history and modifying the regeneration regime based on the recorded history.” This device is not taught or suggested by the Kamihara-Kagenishi-Oshima combination.

As discussed above in relation to the patentability of independent claim 1, the Kamihara-Kagenishi-Oshima combination fails to teach or suggest “pre-heating fuel to be injected with vehicle waste heat,” as recited by independent claim 32. For this reason, without more, this claim is patentable over the combination. Furthermore, as discussed above, Oshima would not have been combined with the other references because there is no motivation to do so and the references teach away from their combination. For these reasons, Applicants respectfully request that the rejection of independent claim 32 be withdrawn and the claim allowed.

Claim 33 defines a method of controlling exhaust and recites “increasing an exhaust stream temperature; controlling said increasing an exhaust stream temperature in conjunction with a catalytic treatment element; metering fuel injection dependent upon said exhaust stream temperature; pre-heating fuel to be injected with vehicle waste heat; recording a regeneration regime history and modifying the regeneration regime based on the recorded history.” This method is not taught or suggested by the Kamihara-Kagenishi-Oshima combination.

As discussed above in relation to the patentability of independent claim 1, the Kamihara-Kagenishi-Oshima combination fails to teach or suggest “pre-heating fuel to be injected with vehicle waste heat,” as recited by independent claim 33. For this reason, without more, this claim is patentable over the combination. Furthermore, as discussed above, Oshima would not have been combined with the other references because there is no motivation to do so and the references teach away from their combination. For these reasons, Applicants respectfully request that the rejection of independent claim 33 be withdrawn and the claim allowed.

Claim 34 defines an apparatus for controlling exhaust and recites “means for increasing an exhaust stream temperature; means for controlling said increasing an exhaust stream temperature in conjunction with a catalytic treatment element; means for metering fuel injection dependent upon said exhaust stream temperature; means for pre-heating fuel to be injected with vehicle waste heat; and means for recording a regeneration regime history and modifying the regeneration regime based on the recorded history.” This apparatus is not taught or suggested by the Kamihara-Kagenishi-Oshima combination.

As discussed above in relation to the patentability of independent claim 1, the Kamihara-Kagenishi-Oshima combination fails to teach or suggest “means for pre-heating fuel to be injected with vehicle waste heat,” as recited by independent claim 34. The cited combination performs no such function and discloses no structure for performing such a function. For this reason, without more, this claim is patentable over the combination. Furthermore, as discussed above, Oshima would not have been combined with the other references because there is no motivation to do so and the references teach away from their combination. For these reasons, Applicants respectfully request that the rejection of independent claim 34 be withdrawn and the claim allowed.

Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kamihara in view of Oshima, Kagenishi, and U.S. Patent 4,535,588 (“Sato”). Applicant respectfully traverses this rejection.

Claim 4 depends from independent claim 1, which has been discussed above as patentable over the Kamihara-Oshima-Kagenishi combination. Claim 4 is patentable thereover for the same reasons. Sato adds nothing to the former art combination so as to render independent claim 1 or dependent claim 4 unpatentable. Specifically, the Kamihara-Oshima-Kagenishi-Sato combination fails to teach or suggest “pre-heating fuel to be injected with vehicle waste heat.” For at least this reason, claim 4 is patentable over the cited are. Applicants respectfully request that the 35 U.S.C. § 103(a) rejection of claim 4 be withdrawn and the claim allowed.

Claims 9 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kamihara in view of Oshima, Kagenishi, and U.S. Patent 5,884,475 (“Hofmann”). Applicant respectfully traverses this rejection.

Claims 9 and 10 depend from independent claim 1, which has been discussed above as patentable over the Kamihara-Oshima-Kagenishi combination. Claims 9 and 10 are patentable thereover for the same reasons. Hofmann adds nothing to the former art combination so as to render independent claim 1 or dependent claims 9 and 10 unpatentable. Specifically, the Kamihara-Oshima-Kagenishi-Hofmann combination fails to teach or suggest “pre-heating fuel to be injected with vehicle waste heat.” For at least this reason, claims 9 and 10 are patentable over the cited are. Applicants respectfully request that the 35 U.S.C. § 103(a) rejection of claims 9 and 10 be withdrawn and the claims allowed.

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 4,492,079 (“Takagi”) in view of Kamihara, Oshima, and Kagenishi. Applicants respectfully traverse this rejection.

Claim 11 defines a method of triggering an exhaust filter regeneration regime and recites “obtaining a value of filter load as function of a filter pressure and an exhaust mass flow and triggering a regeneration regime when the filter load exceeds a predetermined value; initiating fuel injection into an exhaust stream upon triggering the exhaust filter regeneration regime; pre-heating fuel to be injected with vehicle waste heat; and recording a regeneration regime history and

modifying the regeneration regime based on the recorded history.” This method is not taught or suggested by the Takagi-Kamihara-Oshima-Kagenishi combination.

As discussed above in relation to claim 1, the combination of Kamihara-Kagenishi-Oshima, without Takagi, fails to teach or suggest “pre-heating fuel to be injected with vehicle waste heat,” as recited by independent claim 11. Furthermore, these three references would not have been combined as there would have been no motivation to do so and they teach away from their combination. Takagi cannot remedy either deficiency of the former combination so as to achieve, teach, or suggest the claimed subject matter or to make the references combinable. In fact, the office action (at 6) identifies that Takagi, like the other references, fails to teach the pre-heating feature of the claimed subject matter. Therefore, claim 11 is patentable over the combination. Applicants respectfully request that the rejection of claim 11 be withdrawn and the claim allowed.

Claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kamihara in view of Oshima, Kagenishi, and Takagi. Applicant respectfully traverses this rejection.

Claim 15 depends from independent claim 14, which has been discussed above as patentable over the Kamihara-Oshima-Kagenishi combination. Claim 15 is patentable thereover for the same reasons. Takagi adds nothing to the former art combination so as to render independent claim 14 or dependent claim 15 unpatentable. Specifically, as discussed in relation to the patentability of independent claim 11, the Kamihara-Oshima-Kagenishi-Takagi combination fails to teach or suggest “pre-heating fuel to be injected with vehicle waste heat.” For at least this reason, claim 15 is patentable over the cited art. Applicants respectfully request that the 35 U.S.C. § 103(a) rejection of claim 15 be withdrawn and the claim allowed.

Claims 19, 20, and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kamihara in view of Oshima, Kagenishi, and U.S. Patent 6,192,677 (“Tost”). Applicant respectfully traverses this rejection.

Claims 19, 20, and 22 depend from independent claim 18, which has been discussed above as patentable over the Kamihara-Oshima-Kagenishi combination. Claims 19, 20, and 22 are patentable thereover for the same reasons. Tost adds nothing to the former art combination so as to render independent claim 18 or dependent claims 19, 20, and 22 unpatentable. Specifically, the Kamihara-Oshima-Kagenishi-Tost combination fails to teach or suggest “an exhaust stream conduit and a fuel injector mounted therein and arranged to inject fuel in an exhaust stream direction and pre-heat fuel to be injected with vehicle waste heat.” For at least this reason, claims 19, 20, and 22 are patentable over the cited art. Applicants respectfully request that the 35 U.S.C. § 103(a) rejection of claims 19, 20, and 22 be withdrawn and the claims allowed.

Claim 21 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kamihara in view of Oshima, Kagenishi, and U.S. Patent 7,140,874 (“Ingalls”). Applicant respectfully traverses this rejection.

Claim 21 depends from independent claim 18, which has been discussed above as patentable over the Kamihara-Oshima-Kagenishi combination. Claim 21 is patentable thereover for the same reasons. Ingalls adds nothing to the former art combination so as to render independent claim 18 or dependent claim 21 unpatentable. Specifically, the Kamihara-Oshima-Kagenishi-Ingalls combination fails to teach or suggest “an exhaust stream conduit and a fuel injector mounted therein and arranged to inject fuel in an exhaust stream direction and pre-heat fuel to be injected with vehicle waste heat.” For at least this reason, claim 21 is patentable over the cited art. Applicants respectfully request that the 35 U.S.C. § 103(a) rejection of claim 21 be withdrawn and the claim allowed.

Claims 23, 24, and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kamihara in view of Oshima, Kagenishi, and U.S. Patent 5,388,406 (“Takeshima”). Applicant respectfully traverses this rejection.

Claims 23, 24, and 26 depend from independent claim 17, which has been discussed above as patentable over the Kamihara-Oshima-Kagenishi combination. Claims 23, 24, and 26 are

patentable thereover for the same reasons. Takeshima adds nothing to the former art combination so as to render independent claim 17 or dependent claims 23, 24, and 26 unpatentable. Specifically, the Kamihara-Oshima-Kagenishi-Takeshima combination fails to teach or suggest "the apparatus is further arranged to pre-heat fuel to be injected with vehicle waste heat." For at least this reason, claims 23, 24, and 26 are patentable over the cited art. Applicants respectfully request that the 35 U.S.C. § 103(a) rejection of claims 23, 24, and 26 be withdrawn and the claims allowed.

In view of the above, Applicant believes the pending application is in condition for allowance.

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